

WHAT IS CLAIMED IS:

1. A method of depositing granules onto a moving substrate comprising:
providing a hopper for containing granules, the hopper having a discharge
5 slot;
moving a gate across the slot to open and close the slot, whereby when the
slot is open granules fall from the hopper, and when the slot is closed granules are
prevented from falling from the hopper;
detecting the speed of the substrate; and
10 controlling the extent of opening of the slot by the gate to meter the granules
falling from the hopper in response to the speed of the substrate.
2. The method of claim 1 in which the step of controlling the extent of
opening of the slot includes independently controlling the speed of the movement
15 of the gate and the extent of opening of the slot by the gate to meter the granules
falling from the hopper.
3. The method according to claim 1, wherein the valve comprises one of
a rotary valve, a slide valve, a fluted roll and a pneumatic valve.
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4. The method according to claim 3, wherein the valve comprises a
rotary valve.
5. A method of depositing granules onto a moving substrate comprising:
25 providing a hopper for containing granules, the hopper having a discharge
slot;
moving a gate across the slot to open and close the slot, whereby when the
slot is open granules fall from the hopper, and when the slot is closed granules are
prevented from falling from the hopper;
30 controlling the speed of the movement of the gate; and

independently controlling the extent of opening of the slot by the gate to meter the granules falling from the hopper.

6. The method of claim 5 in which the controlling of the extent of opening of the slot is done in response to the speed of the substrate.

7. A method of depositing granules onto a moving substrate comprising: providing a hopper for containing granules, the hopper having a discharge slot;
10 moving a gate across the slot to open and close the slot, whereby when the slot is open granules fall from the hopper, and when the slot is closed granules are prevented from falling from the hopper;
controlling the acceleration rate of the gate during the opening of the slot so that the acceleration rate does not exceed about 4 g.

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8. The method of claim 7 in which the maximum acceleration rate of the gate during the opening of the slot is about 3 g.

9. The method of claim 7 in which the maximum acceleration rate of the gate during the opening of the slot is about 2 g.

10. The method of claim 7, further comprising:
controlling the speed of the movement of the gate; and
independently controlling the extent of opening of the slot by the gate to
25 meter the granules falling from the hopper.

11. The method of claim 10 in which the controlling of the extent of opening of the slot is done in response to the speed of the substrate.

12. A method of depositing granules onto a moving substrate comprising:

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providing a hopper for containing granules, the hopper having a discharge slot;

moving a gate across the slot to open and close the slot, whereby when the slot is open granules fall from the hopper, and when the slot is closed granules are prevented from falling from the hopper;

controlling the acceleration of the gate during one of the opening of the slot and the closing of the slot, so that the acceleration rate is positive during a first portion of the one of the opening and closing of the slot, and the acceleration rate is approximately zero during a second portion of the one of the opening and closing of the slot.

13. The method of claim 12 including controlling the acceleration rate of the gate during the one of the opening and closing of the slot so that the acceleration rate does not exceed about 4 g.

14. The method of claim 13 in which the maximum acceleration rate of the gate during the one of the opening and closing of the slot does not exceed about 3 g.

15. The method of claim 14 in which the maximum acceleration rate of the gate during the one of the opening and closing of the slot does not exceed about 2 g.

16. The method of claim 13 in which the velocity of the gate during the second portion of the one of the opening and closing of the slot is within the range of from about 10 to about 130 ft./min.

17. The method of claim 16 which the velocity of the gate during the second portion of the one of the opening and closing of the slot is greater than about 90 ft./min.

18. The method of claim 16 which the velocity of the gate during the second portion of the one of the opening and closing of the slot is less than about 30 ft./min.

5 19. A method of depositing granules onto a moving substrate comprising:
providing a hopper for containing granules, the hopper having a discharge
slot;
moving a gate across the slot to open and close the slot, whereby when the
slot is open granules fall from the hopper, and when the slot is closed granules are
10 prevented from falling from the hopper;
controlling the velocity of the gate during the closing of the slot so that the
velocity does not exceed about 130 ft./min.

15 20. A method of depositing granules onto a moving substrate comprising:
providing a hopper for containing granules, the hopper having a discharge
slot;
moving a gate across the slot to open and close the slot, whereby when the
slot is open granules fall from the hopper, and when the slot is closed granules are
prevented from falling from the hopper;
20 detecting the speed of the substrate; and
controlling one of the group consisting of the extent of opening of the slot by
the gate to meter the granules falling from the hopper in response to the speed of
the substrate; the acceleration rate of the gate; and the speed of the movement of
the gate and the extent of opening of the slot by the gate to meter the granules
25 falling from the hopper.

21. The method of claim 20 wherein the step of controlling comprises
controlling the extent of opening of the slot includes independently controlling the
speed of the movement of the gate and the extent of opening of the slot by the gate
30 to meter the granules falling from the hopper.

22. The method of claim 21 in which the controlling of the extent of opening of the slot is done in response to the speed of the substrate.

23. The method according to claim 20, wherein the valve comprises one
5 of a rotary valve, a slide valve, a fluted roll and a pneumatic valve.

24. The method according to claim 23, wherein the valve comprises a rotary valve.

10 25. The method according to claim 24, further comprising controlling the acceleration of the gate during the opening of the slot so that the acceleration rate is positive during a first portion of the opening of the slot, and the acceleration rate is approximately zero during a second portion of the opening of the slot.

15 26. The method of claim 25 including controlling the acceleration rate of the gate during the opening of the slot so that the acceleration rate does not exceed about 4 g.

20 27. The method of claim 26 in which the maximum acceleration rate of the gate during the opening of the slot is about 2 g.

25 28. The method of claim 27 in which the velocity of the gate during the second portion of the opening of the slot is within the range of from about 10 to about 130 ft./min.

29. The method of claim 28 which the velocity of the gate during the second portion of the opening of the slot is greater than about 90 ft./min.

30 30. The method of claim 28 which the velocity of the gate during the second portion of the opening of the slot is less than about 30 ft./min.

31. A method of depositing granules onto a moving substrate comprising:
providing a hopper for containing granules, the hopper having a discharge
slot;

providing a means for starting and stopping flow from the slot, whereby
5 when granules fall from the hopper and are prevented from falling from the hopper;
detecting the speed of the substrate; and
controlling one of the group consisting of:
the extent of opening of the slot by the gate to meter the granules
falling from the hopper in response to the speed of the substrate;
10 the acceleration rate at which the flow is started and stopped; and
the speed of the movement of the means for starting and stopping
flow gate and the extent of opening of the slot by the gate to meter the
granules falling from the hopper.

15 32. The method of claim 31 wherein the step of controlling comprises
controlling the extent of opening of the slot and independently controlling the speed
of the movement of the gate and the extent of opening of the slot by the gate to
meter the granules falling from the hopper.

20 33. The method of claim 32 wherein the step of controlling further
comprises controlling the acceleration rate at which the flow is started and stopped.

25 34. The method according to claim 33, wherein the means for starting
and stopping flow from the slot comprises a rotary valve.

35. The method according to claim 31, wherein the step of controlling
further comprises producing a blend drop at a low speed and a substantially similar
blend drop at a high speed.

30 36. The method according to claim 35, wherein the step of controlling
further comprises producing a first blend drop at a low speed and a second blend

drop at a high speed, wherein said first blend drop and said second blend drop are substantially similar in appearance.

37. The method according to claim 36, wherein the step of controlling
5 comprises producing a substantially constant blend drop density at said high speed and said low speed.

38. The method according to claim 37, wherein the blend drop density
falling onto said coated sheet is between 1.0 and 1.6 grams/square inch at both said
10 high speed and said low speed.

39. The method according to claim 36, wherein the step of controlling
comprises producing a said first blend drop with a first length and said second
blend drop with a second length, wherein said second length is substantially the
15 same as the first length.

40. The method according to claim 36, wherein the step of controlling
comprises producing a said first blend drop with a first leading edge and first
trailing edge and said second blend drop with a second leading edge and second
20 trailing edge, wherein said first and second leading edges are substantially the same
and said first and second trailing edges are substantially the same.